FORM PTO 1390 (REV 5-93) US DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. §371

ATTORNEY DOCKET NUMBER: 2001_1462A

U.S. APPLICATION NO. (if known, see 37 CFR 1.5): 09/937522

International Application No.	International Filing Date	Priority Date Claimed
PCT/JP00/01816	March 24, 2000	March 26, 1999

Title of Invention
METHOD FOR ULTRA-FAST CONVERSION OF TIME SIGNAL INTO TWO-DIMENSIONAL SPACE SIGNAL

Applicant(s) For DO/EO/US
Yoshiki ICHIOKA et al.

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. [X] This is a **FIRST** submission of items concerning a filing under 35 U.S.C. §371.

2. [] This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. §371.

3. [X] This express request to begin national examination procedures (35 U.S.C. §371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. §371(b) and PCT Articles 22 and 39(1).

4. [X] A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.

5. [X] A copy of the International Application as filed (35 U.S.C. §371(c)(2))
   a. [] is transmitted herewith (required only if not transmitted by the International Bureau).
   b. [X] has been transmitted by the International Bureau. ATTACHMENT A
   c. [] is not required, as the application was filed in the United States Receiving Office (RO/US)

6. [X] A translation of the International Application into English (35 U.S.C. §371(c)(2)). ATTACHMENT B

7. [] Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. §371(c)(3)).
   a. [] are transmitted herewith (required only if not transmitted by the International Bureau).
   b. [] have been transmitted by the International Bureau.
   c. [] have not been made; however, the time limit for making such amendments has NOT expired.
   d. [] have not been made and will not be made.

8. [] A translation of the amendments to the claims under PCT Article 19.

9. [] An oath or declaration of the inventor(s) (35 U.S.C. §371(c)(4)).

10. [] A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. §371(c)(5)).

Items 11. to 14. below concern other document(s) or information included:

11. [X] An Information Disclosure Statement under 37 CFR 1.97 and 1.98. ATTACHMENT C

12. [] An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.

13. [X] A FIRST preliminary amendment. ATTACHMENT D

    [] A SECOND or SUBSEQUENT preliminary amendment.

14. [X] Other items or information:

    - unexecuted Declaration and Power of Attorney with Cover Letter - ATTACHEMTN E

THE COMMISSIONER IS AUTHORIZED TO CHARGE ANY DEFICIENCY IN THE FEES FOR THIS PAPER TO DEPOSIT ACCOUNT NO. 23-0975

U.S. APPLICATION NO. (If known, see 37 CFR) 09/937522	INTERNATIONAL APPLICATION NO. PCT/JP00/01816	ATTORNEY'S DOCKET NO. 2001_1462A

15. [X] The following fees are submitted	CALCULATIONS	PTO USE ONLY
BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5)):		
Neither international preliminary examination fee nor international search fee paid to USPTO and International Search Report not prepared by the EPO or JPO $1000.00		
International Search Report has been prepared by the EPO or JPO ..... $ 860.00		
International preliminary examination fee not paid ot USPTO but international search paid to USPTO ..... $ 710.00		
International preliminary examination fee paid to USPTO but claims did not satisfy provisions of PCT Article 33(1)-(4) ..... $ 690.00		
International preliminary examination fee paid ot USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) ..... $ 100.00		
ENTER APPROPRIATE BASIC FEE AMOUNT =	$860.00	
Surcharge of $130.00 for furnishing the oath or declaration later than [] 20 [] 30 months from the earliest claimed priority date (37 CFR 1.492(e)).	$	

Claims	Number Filed	Number Extra	Rate		
Total Claims	7 - 20 =	0	X $18.00	$	
Independent Claims	1 - 3 =	0	X $80.00	$	
Multiple dependent claim(s) (if applicable)			+ $270.00	$	
TOTAL OF ABOVE CALCULATIONS =				$860.00	
[] Small Entity Status is hereby asserted. Above fees are reduced by 1/2.				$	
SUBTOTAL =				$860.00	
Processing fee of $130.00 for furnishing the English translation later than [] 20 [] 30 months from the earliest claimed priority date (37 CFR 1.492(f)). +				$	
TOTAL NATIONAL FEE =				$860.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). $40 per property +				$	
TOTAL FEES ENCLOSED =				$860.00	
				Amount to be refunded	$
				Amount to be charged	$

a. [X] A check in the amount of $860.00 to cover the above fees is enclosed. A duplicate copy of this form is enclosed.

b. [] Please charge my Deposit Account No. 23-0975 in the amount of $_____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. [X] The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 23-0975.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

19. CORRESPONDENCE ADDRESS

000513

PATENT TRADEMARK OFFICE

By: _____

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September 26, 2001

[CHECK NO. 46652]

[2001_1462A]

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of :

Yoshiki ICHIOKA et al. : **Attn: BOX PCT**

Serial No. NEW : Docket No. 2001_1462A

Filed September 26, 2001 :

THE COMMISSIONER IS AUTHORIZED TO CHARGE ANY DEFICIENCY IN THE FEES FOR THIS PAPER TO DEPOSIT ACCOUNT NO. 23-0975

METHOD FOR ULTRA-FAST CONVERSION OF TIME SIGNAL INTO TWO-DIMENSIONAL SPACE SIGNAL

[Corresponding to PCT/JP00/01816 Filed March 24, 2000]

PRELIMINARY AMENDMENT TO REDUCE PTO FILING FEE

Assistant Commissioner for Patents,
Washington, DC 20231

Sir:

Please amend the above-identified application as follows.

In the Claims:

Kindly amend claims 3 and 4 as follows.

3. (Amended) The method for ultra-fast conversion of time signal into two-dimensional space signal according to claim 1, wherein space frequency filtering is employed as the time-frequency filter.

4. (New) The method for ultra-fast conversion of time signal into two-dimensional space signal according to claim 1, wherein the time-frequency filter has a different transmissivity distribution and a vertical cut out position of a space frequency component of a light wave outputted from the one-dimensional Fourier Transform light system is arbitrarily selected.

ATTACHMENT D

Kindly add new claims 5-7 as follows.

5. (New) The method for ultra-fast conversion of time signal into two-dimensional space signal according to claim 2, wherein space frequency filtering is employed as the time-frequency filter.

6. (New) The method for ultra-fast conversion of time signal into two-dimensional space signal according to claim 2, wherein the time-frequency filter has a different transmissivity distribution and a vertical cut out position of a space frequency component of a light wave outputted from the one-dimensional Fourier Transform light system is arbitrarily selected.

7. (New) The method for ultra-fast conversion of time signal into two-dimensional space signal according to claim 3, wherein the time-frequency filter has a different transmissivity distribution and a vertical cut out position of a space frequency component of a light wave outputted from the one-dimensional Fourier Transform light system is arbitrarily selected.

REMARKS

The above claim amendments are presented in order to remove multiple claim dependencies, so as to reduce the required filing fee.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "**Version with markings to show changes made**."

Respectfully submitted,

Yoshiki ICHIOKA et al.

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difference of incident positions on the dispersion device are passed through an one-dimensional Fourier transformation optical system so as to be converted into one-dimensional frequency light distributions having different incident angles depending on the incident positions on the dispersion device, the one-dimensional frequency light distributions is introduced into a nonlinear optical crystal, a second-harmonic which is generated by satisfying phase matching condition determined depending on an angle formed by the incident one-dimensional frequency light distributions is subjected to time-to-space conversion through an inverse one-dimensional Fourier transformation optical system so as to be converted to an one-dimensional space distribution, the time-to-space converted one-dimensional space distribution is converted into an one-dimensional space frequency distribution by an one-dimensional Fourier transformation optical system, the one-dimensional space frequency distribution is subjected to filtering by a time-space filter, light wave thus obtained is subjected to time-frequency expansion through an inverse one-dimensional Fourier transform optical system so as to obtain an intensity distribution of a two-dimensional light distribution, and the time-frequency expanded two-dimensional light distribution representing a relation between time and frequency of the signal pulse light is regarded as a two dimensional space signal.

3. The method for ultra-fast conversion of time signal into

two-dimensional space signal according to claim 1 ~~or 2~~, wherein space frequency filtering is employed as the time-frequency filter.

4. The method for ultra-fast conversion of time signal into two-dimensional space signal according to ~~any one of~~ claims 1 ~~to 3~~, wherein the time-frequency filter has a different transmissivity distribution and a vertical cut out position of a space frequency component of a light wave outputted from the one-dimensional Fourier Transform light system is arbitrarily selected.

1/RATS

DESCRIPTION

METHOD FOR ULTRA-FAST CONVERSION OF TIME SIGNAL INTO TWO-DIMENSIONAL SPACE SIGNAL

Technical Field

The present invention relates to a method for ultra-fast conversion of two-dimensional information encoded to an ultra-short light pulse signal into a two-dimensional space signal.

Background Art

In optical communication, transmission capacity has been increased by using methods such as time multiplexing or wavelength multiplexing for realization of real-time transmission of multi-media information (particularly, image information). The signal form used for the real-time transmission is basically a time signal. Because of the transmission capacity increase, it is necessary to perform conversion (encoding) of information to be transmitted into time signals and expansion (decoding) of the information converted into the time signals at a ultra-high speed. For this reason, there has been proposed a "space-to-time-to-space signal processing method" which realizes ultra-fast conversion of signal form between time signal and two or more dimensional space signal such as image information. However, this space-to-time-to-space signal processing method has a problem that must be solved in time-to-two-dimensional space signal conversion technology.

Various methods have been proposed as the method for realizing ultra-fast conversion of signal form between time signal and space signal. However, although the conventional methods are capable of carrying out ultra-fast conversion into one-dimensional space signal, some of them basically need to perform active scanning for conversion into two or more dimensional space signal and thus have a limitation in transformation speed. On the other hand, there are some methods that do not need to perform active scanning, but space signal converted by such methods cannot be observed with any ultra-fast light-receiving device available today.

Disclosure of Invention

Accordingly, an object of the present invention is to provide a method for ultra-fast conversion of time signal into two-dimensional space signal which is capable of realizing ultra-fast conversion of signal form from time signal to two-dimensional space signal without performing active-scan and also is capable of displaying the two-dimensional space signal in a visible region with a temporally steady state.

To attain the above-described object, firstly, the present invention provides a method for ultra-fast conversion of time signal into two-dimensional space signal wherein a signal light pulse and a reference ultra-short light pulse having an appropriate width in space are introduced into a nonlinear crystal through a dispersion device and an one-dimensional Fourier transformation optical system, a second-harmonic which

is generated by satisfying phase matching condition in the nonlinear crystal is subjected to time-to-space conversion through an inverse one-dimensional Fourier transformation optical system so as to be converted into an one-dimensional space distribution, the time-to-space converted one-dimensional space distribution is subjected to filtering with a time-frequency filter provided on a filter plane of an one-dimensional space frequency filtering optical system, and a time-frequency expanded two-dimensional light distribution representing a relation between time and frequency of the signal pulse light is regarded as a two dimensional space signal.

Secondly, the present invention provides a method for ultra-fast conversion of time signal into two-dimensional space signal wherein a signal light pulse and a reference ultra-short light pulse having an appropriate width in space are introduced into a dispersion device at angles symmetric with respect to optical axis, light waves from the signal light pulse and the reference ultra-short light pulse which are dispersed due to a time difference generated by a difference of incident positions on the dispersion device are passed through an one-dimensional Fourier transformation optical system so as to be converted into one-dimensional frequency light distributions having different incident angles depending on the incident positions on the dispersion device, the one-dimensional frequency light distributions is introduced into a nonlinear optical crystal, a second-harmonic which is generated by satisfying phase matching condition determined depending on an angle formed by the incident

one-dimensional frequency light distributions is subjected to time-to-space conversion through an inverse one-dimensional Fourier transformation optical system so as to be converted to an one-dimensional space distribution, the time-to-space converted one-dimensional space distribution is converted into an one-dimensional space frequency distribution by an one-dimensional Fourier transformation optical system, the one-dimensional space frequency distribution is subjected to filtering by a time-space filter, light wave thus obtained is subjected to time-frequency expansion through an inverse one-dimensional Fourier transform optical system so as to obtain an intensity distribution of a two-dimensional light distribution, and the time-frequency expanded two-dimensional light distribution representing a relation between time and frequency of the signal pulse light is regarded as a two dimensional space signal.

Thirdly, the present invention provides the above-described methods for ultra-fast conversion of time signal into two-dimensional space signal wherein space frequency filtering is employed as the time-frequency filter, and fourthly, the present invention provides either of the above-described methods for ultra-fast conversion of time signal into two-dimensional space signal wherein the time-frequency filter has a different transmissivity distribution and a vertical cut out position of a space frequency component of a light wave outputted from the one-dimensional Fourier Transform light system is arbitrarily selected.

Brief Description of Drawings

Fig. 1 is a diagram showing an example of the structure of time-to-two-dimensional space signal conversion optical system to be used in the method for ultra-fast conversion of time signal into two-dimensional space signal according to the present invention.

Reference numerals designate the followings.

1: time-to-two-dimensional space signal conversion optical system

2: diffraction grating

3: signal light

4: reference light

5: cylindrical lens

6: nonlinear crystal

7: one-dimensional frequency distribution of signal light

8: one-dimensional frequency distribution of reference light

9: cylindrical lens

10: cylindrical lens

11: time-frequency filter

12: cylindrical lens

13: two-dimensional space distribution

100: incident plane

101: nonlinear crystal plane

102: time-to-space conversion plane

103: time-frequency filter plane

104: output plane

Best Mode for Carrying Out the Invention

The present invention has the forgoing features, and the embodiment thereof will be described hereinafter.

Fig. 1 shows an example of the structure of the time-to-two-dimensional space signal conversion optical system for performing the method of ultra-fast conversion from time signal to two-dimensional space signal according to the present invention. This time-to-two-dimensional space signal conversion optical system 1 is capable of converting a signal light pulse being a time signal, which is ultra-short pulse laser light in this example, into a two-dimensional space signal corresponding to time and frequency by using a dispersion device such as a diffraction grating, an one-dimensional Fourier transformation lens, an one-dimensional inverse-Fourier transformation lens, a nonlinear crystal for generation of a second-harmonic, an one-dimensional space frequency filtering system, and time-frequency filter. That is, as shown in Fig. 1, signal lights (3) and (4) are introduced into a diffraction grating (2), which is a dispersion device, at angles symmetric with respect to optical axis, thereby light waves are deflected in a direction based on the diffraction formula. Because each of the signal light and the reference light has a certain width in its incident beam, a time difference occurs depending on their incident positions onto the diffraction grating. Then, the light waves are subjected to Fourier transform with respect to horizontal components by an one-dimensional Fourier transform

optical system composed of a cylindrical lens (5), thereby spectrum distributions of the signal light and the reference light are obtained on a nonlinear crystal plane (101) as space distributions. Because the propagation direction (wave vector) of the light wave differs depending on a difference of the incident position onto the diffraction grating, the wavefront of the light wave rotates with time in the nonlinear crystal plane 101.

When the light waves of the signal light and the reference light are introduced into the nonlinear crystal, there is emitted a second-harmonic whose wave vector is a sum of two wave vectors by phase matching due to nonlinear effect. Although the wave vectors of the light waves of the signal light and the reference light rotate with time, the second-harmonic continues to be emitted in a steady state on time basis because change rates of the rotation with time are equal. Therefore, the wave vector of the second-harmonic depends on only initial wave vectors of the wave vectors of the two light waves, so that it depends on a relative time between the signal light and the reference light. Further, within the nonlinear crystal, the light wave of the signal light is scanned by the light wave of the reference light and thus the space distribution of the second harmonic becomes equal to the spectrum distribution 7 of the signal light.

The second-harmonic thus obtained is image-formed on a time-frequency filter plane (103) by an image-formation optical system comprised of cylindrical lenses (9)(10). As a time-frequency filter (11), a filter designed such that the frequency of frequency component to be cut out is increased in

order in a vertical direction is used. By changing transmissivity distribution of the time-frequency filter, it is possible to set up which frequency component can be cut out to which position in the vertical direction.

The second-harmonic filtered by the time-frequency filter has a wave vector corresponding to time in a horizontal direction and a distribution corresponding to frequency in a vertical direction. This second-harmonic is subjected to Fourier transformation about its horizontal direction component by an one-dimensional inverse Fourier transformation optical system comprised of a cylindrical lens (12). As a result, there is obtained, on an output plane (104), a two-dimensional space distribution (13) of the light wave having a time distribution in the horizontal axis direction and a spectrum distribution in the vertical direction. Consequently, it is possible to convert the time signal contained in the ultra-short light pulse into the two-dimensional space distribution of time and frequency.

Of course, the present invention is not restricted to the above-described example and may be changed or modified in various ways. For example, although the diffraction grating is employed as the dispersion device in the above-described example, other dispersion device may be used. Further, although the cylindrical lenses are employed as the Fourier transformation optical system and the inverse-Fourier transformation optical system in the above-described example, other optical device may be used. Furthermore, although the transmission type filter

is used as the time-frequency filter in the above-described example, a phase type filter may also be used.

Industrial Applicability

As described above, according to the method for ultra-fast conversion of time signal into two-dimensional space signal of the present invention, it is possible to convert the time signal into its corresponding two-dimensional space signal at a ultra-high speed without performing active-scan unlike the conventional method and also display the converted signal directly with a visible light when an infrared ray falling in a wavelength region used in optical transmission is employed.

CLAIMS

1. A method for ultra-fast conversion of time signal into two-dimensional space signal wherein a signal light pulse and a reference ultra-short light pulse having an appropriate width in space are introduced into a nonlinear crystal through a dispersion device and an one-dimensional Fourier transformation optical system, a second-harmonic which is generated by satisfying phase matching condition in the nonlinear crystal is subjected to time-to-space conversion through an inverse one-dimensional Fourier transformation optical system so as to be converted into an one-dimensional space distribution, the time-to-space converted one-dimensional space distribution is subjected to filtering with a time-frequency filter provided on a filter plane of an one-dimensional space frequency filtering optical system, and a time-frequency expanded two-dimensional light distribution representing a relation between time and frequency of the signal pulse light is regarded as a two dimensional space signal.

2. A method for ultra-fast conversion of time signal into two-dimensional space signal wherein a signal light pulse and a reference ultra-short light pulse having an appropriate width in space are introduced into a dispersion device at angles symmetric with respect to optical axis, light waves from the signal light pulse and the reference ultra-short light pulse which are dispersed due to a time difference generated by a

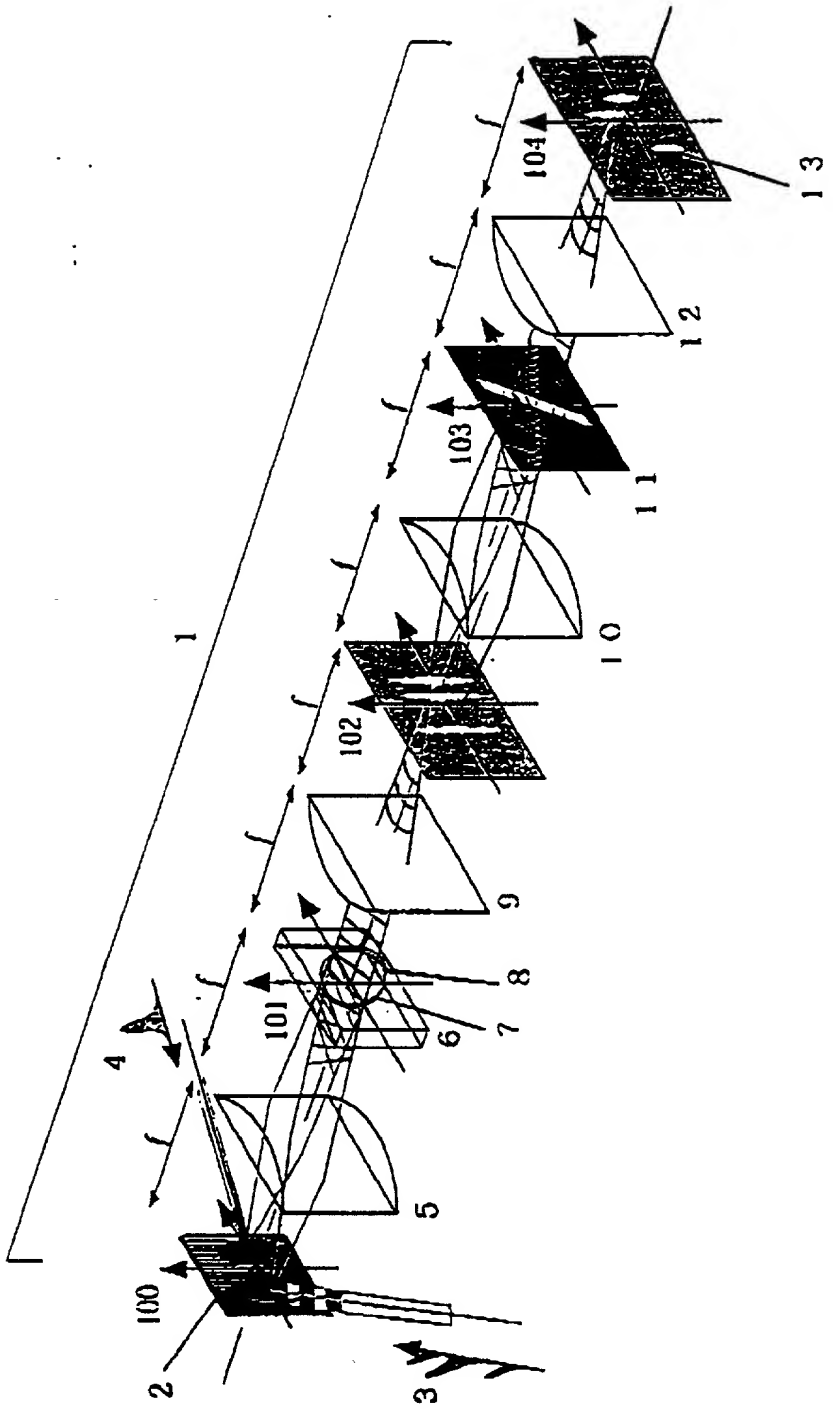
difference of incident positions on the dispersion device are passed through an one-dimensional Fourier transformation optical system so as to be converted into one-dimensional frequency light distributions having different incident angles depending on the incident positions on the dispersion device, the one-dimensional frequency light distributions is introduced into a nonlinear optical crystal, a second-harmonic which is generated by satisfying phase matching condition determined depending on an angle formed by the incident one-dimensional frequency light distributions is subjected to time-to-space conversion through an inverse one-dimensional Fourier transformation optical system so as to be converted to an one-dimensional space distribution, the time-to-space converted one-dimensional space distribution is converted into an one-dimensional space frequency distribution by an one-dimensional Fourier transformation optical system, the one-dimensional space frequency distribution is subjected to filtering by a time-space filter, light wave thus obtained is subjected to time-frequency expansion through an inverse one-dimensional Fourier transform optical system so as to obtain an intensity distribution of a two-dimensional light distribution, and the time-frequency expanded two-dimensional light distribution representing a relation between time and frequency of the signal pulse light is regarded as a two dimensional space signal.

3. The method for ultra-fast conversion of time signal into

two-dimensional space signal according to claim 1 or 2, wherein space frequency filtering is employed as the time-frequency filter.

4. The method for ultra-fast conversion of time signal into two-dimensional space signal according to any one of claims 1 to 3, wherein the time-frequency filter has a different transmissivity distribution and a vertical cut out position of a space frequency component of a light wave outputted from the one-dimensional Fourier Transform light system is arbitrarily selected.

Fig.1



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Rev. 3-21-01

Effective March 1998

DECLARATION AND POWER OF ATTORNEY FOR U.S. PATENT APPLICATION

() Original () Supplemental () Substitute (X) PCT () DESIGN

As a below named inventor, I hereby declare that: my residence, post office address and citizenship are as stated below next to my name; that I verily believe that I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Title: METHOD FOR ULTRA-FAST CONVERSION OF TIME SIGNAL INTO TWO-DIMENSIONAL SPACE SIGNAL

of which is described and claimed in:
() the attached specification, or
() the specification in application Serial No. _____, filed _____, and with amendments through _____, or
(X) the specification in International Application No. PCT/JP00/01816, filed March 24, 2000, and as amended on _____ (if applicable).

I hereby state that I have reviewed and understand the content of the above-identified specification, including the claims, as amended by any amendment(s) referred to above.

I acknowledge my duty to disclose to the Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

I hereby claim priority benefits under Title 35, United States Code, §119 (and §172 if this application is for a Design) of any application(s) for patent or inventor's certificate listed below and have also identified below any application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

COUNTRY	APPLICATION NO.	DATE OF FILING	PRIORITY CLAIMED
Japan	1999-083905	March 26, 1999	YES

I hereby claim the benefit under Title 35, United States Code §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code §112, I acknowledge the duty to disclose information material to patentability as defined in Title 37, Code of Federal Regulations, §1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

APPLICATION SERIAL NO.	U.S. FILING DATE	STATUS: PATENTED, PENDING, ABANDONED

And I hereby appoint Michael R. Davis, Reg. No. 25,134; Matthew M. Jacob, Reg. No. 25,154; Warren M. Cheek, Jr., Reg. No. 33,367; Nils Pedersen, Reg. No. 33,145; Charles R. Watts, Reg. No. 33,142; and Michael S. Huppert, Reg. No. 40,268, who together constitute the firm of WENDEROTH, LIND & PONACK, L.L.P., as well as any other attorneys and agents associated with Customer No. 000513, to prosecute this application and to transact all business in the U.S. Patent and Trademark Office connected therewith.

I hereby authorize the U.S. attorneys and agents named herein to accept and follow instructions from NISHIZAWA & ASSOCIATES as to any action to be taken in the U.S. Patent and Trademark Office regarding this application without direct communication between the U.S. attorneys and myself. In the event of a change in the persons from whom instructions may be taken, the U.S. attorneys named herein will be so notified by me.

I further declare that all statements made herein of my own knowledge are true, and that all statements on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

1st Inventor Yoshiki ICHIOKA Date January 28, 2002

2nd Inventor Tsuyoshi KONISHI Date January 28, 2002

3rd Inventor _____ Date _____

4th Inventor _____ Date _____

5th Inventor _____ Date _____

6th Inventor _____ Date _____

The above application may be more particularly identified as follows:

U.S. Application Serial No. _____ Filing Date September 26, 2001

Applicant Reference Number 00-F-014PCT-US/KT Atty Docket No. 2001_1462A

Title of Invention METHOD FOR ULTRA-FAST CONVERSION OF TIME SIGNAL INTO TWO-DIMENSIONAL SPACE SIGNAL